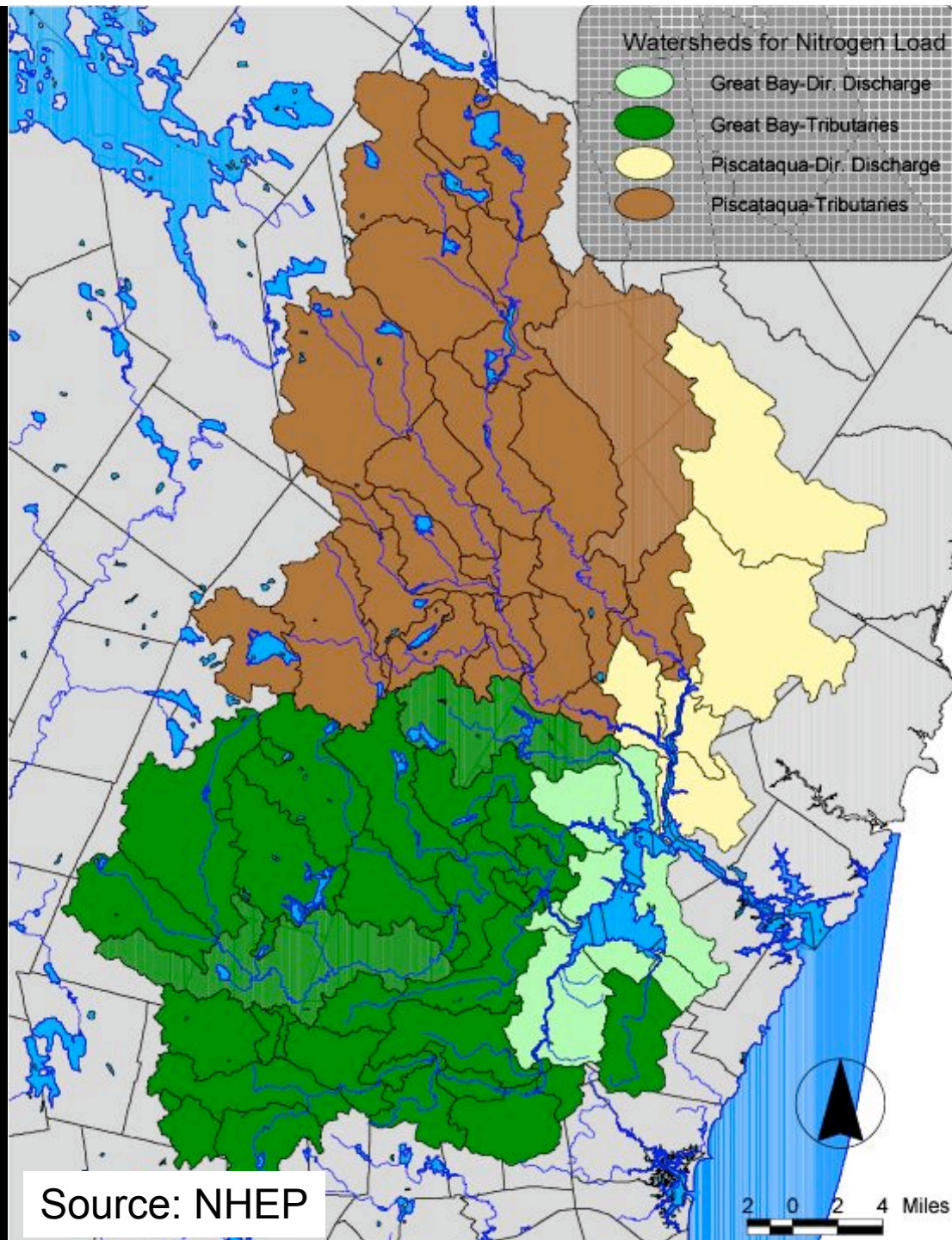


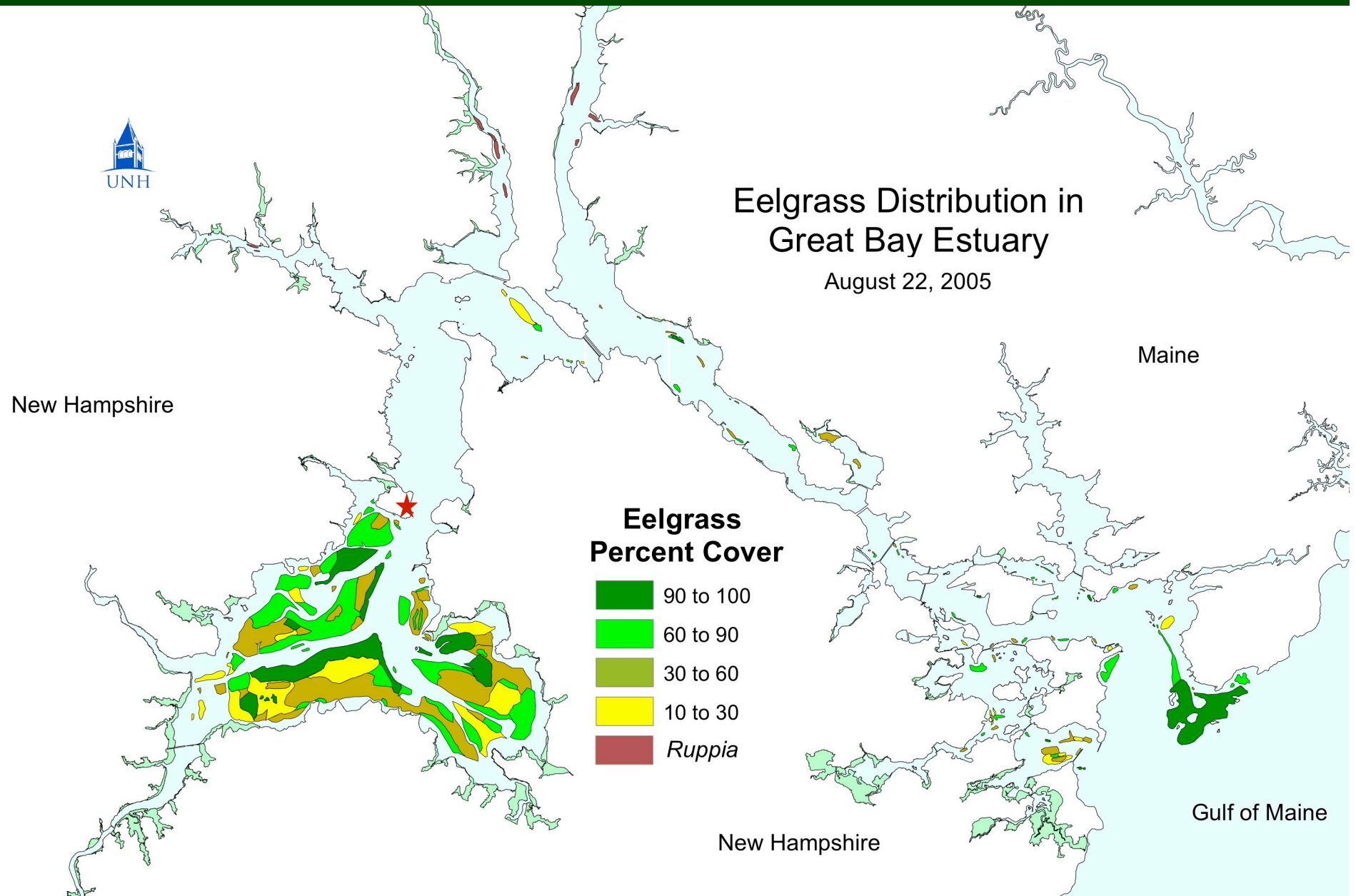
Impacts of Sediment Loading and Siltation in the GBE

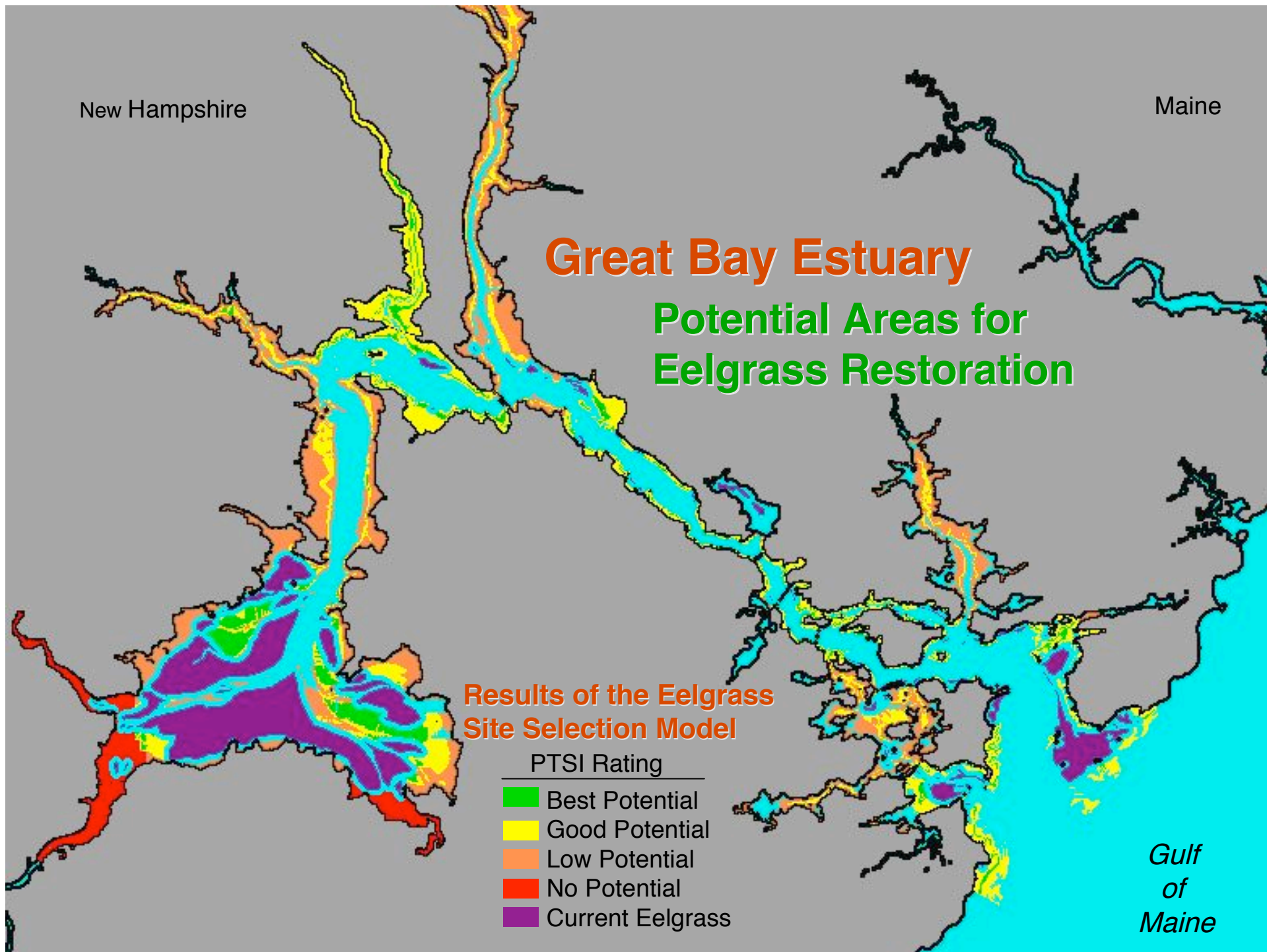
Fred Short, JEL, UNH



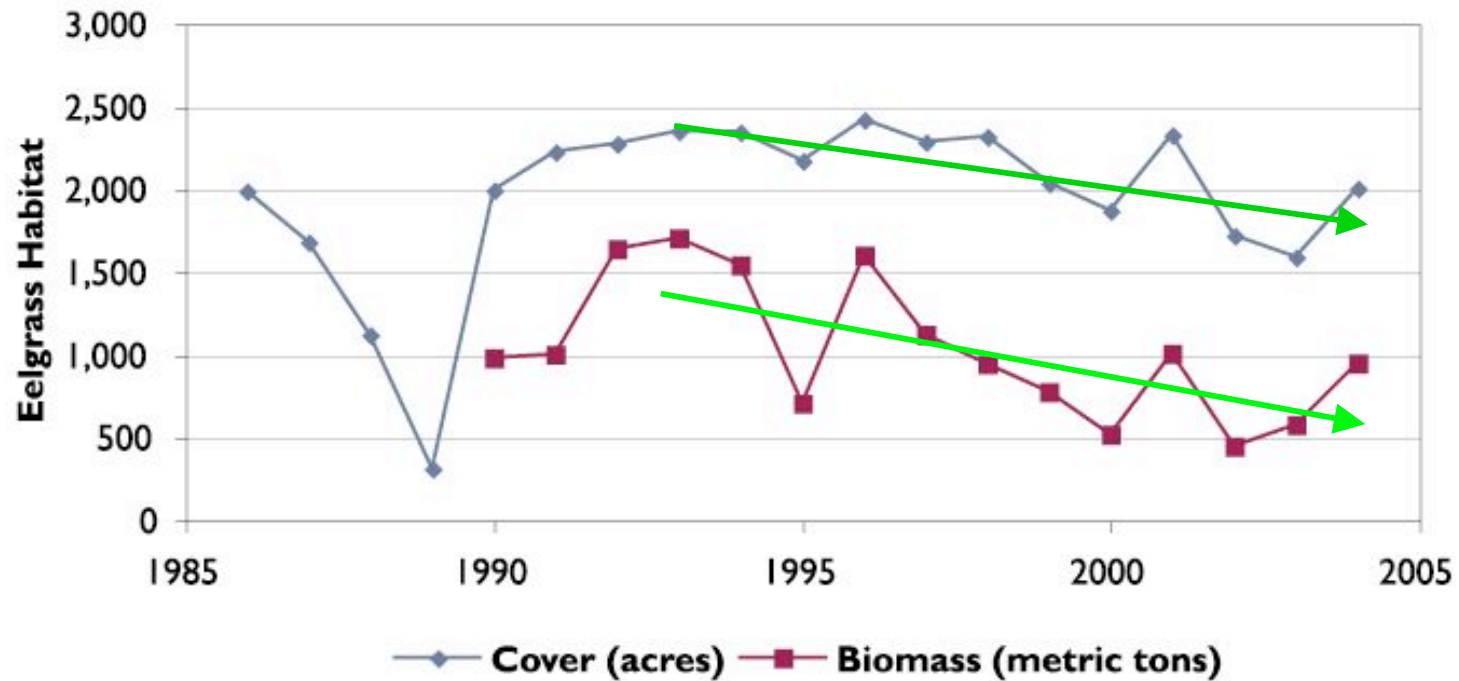
Source: NHEP

Seagrass in the Great Bay Estuary



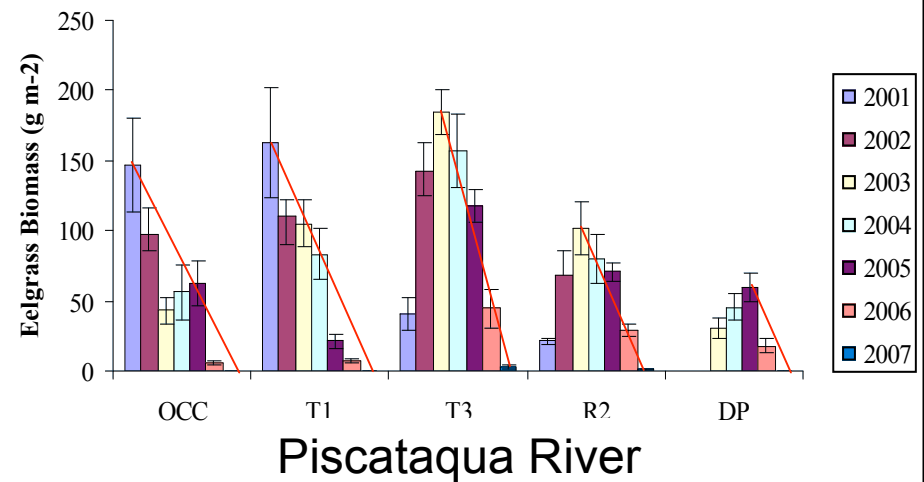


Monitoring Eelgrass cover and biomass in the Great Bay (Figure 17)



Data Source: UNH Seagrass Ecology Group

GBE eelgrass
decline

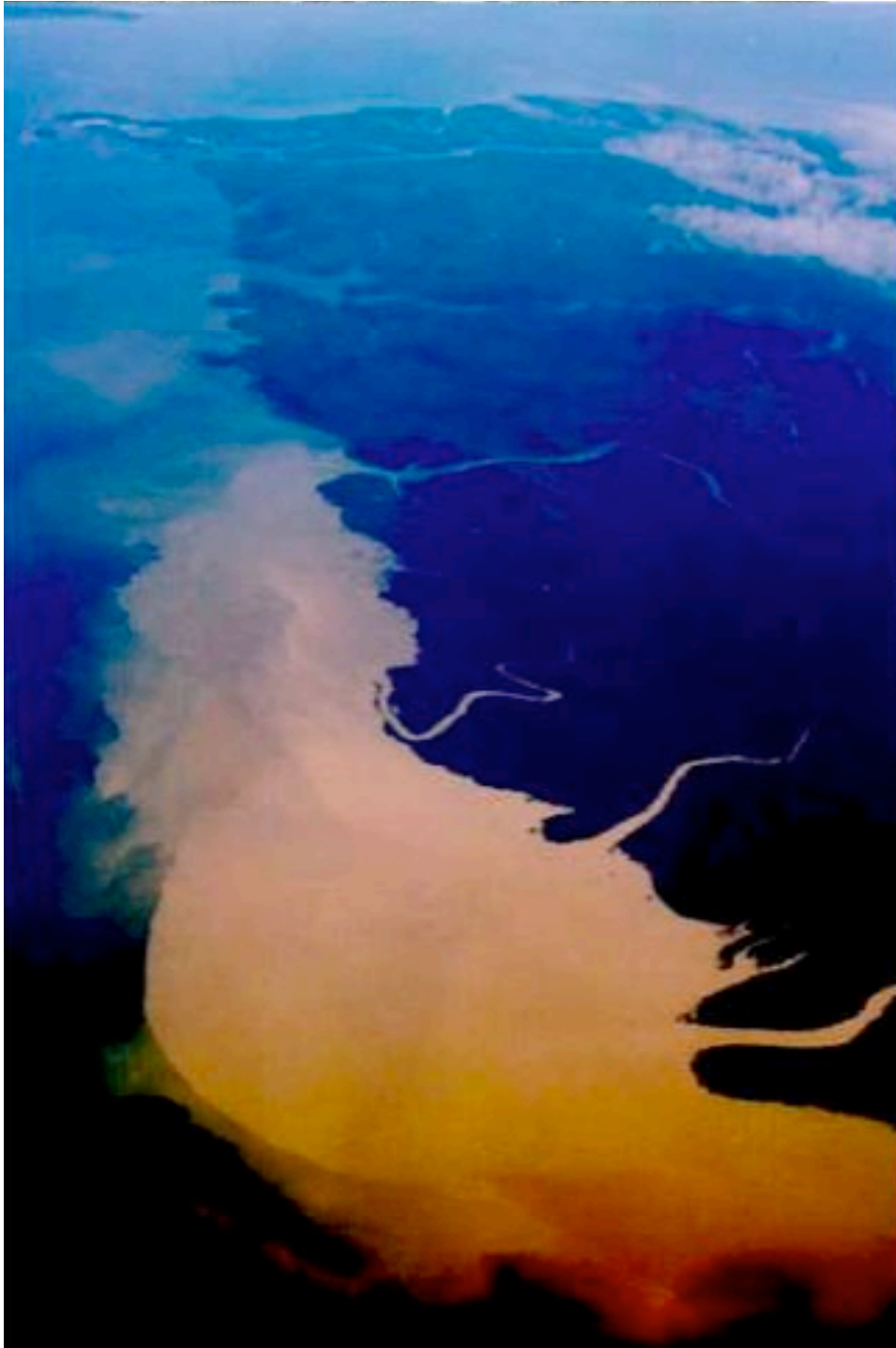




Restored Eelgrass

Causes of current eelgrass decline in GBE

- **Reduced water clarity**
 - Sediment loading
 - Nutrient loading
 - Siltation from dredging
 - Cumulative impacts



Sedimentation

--

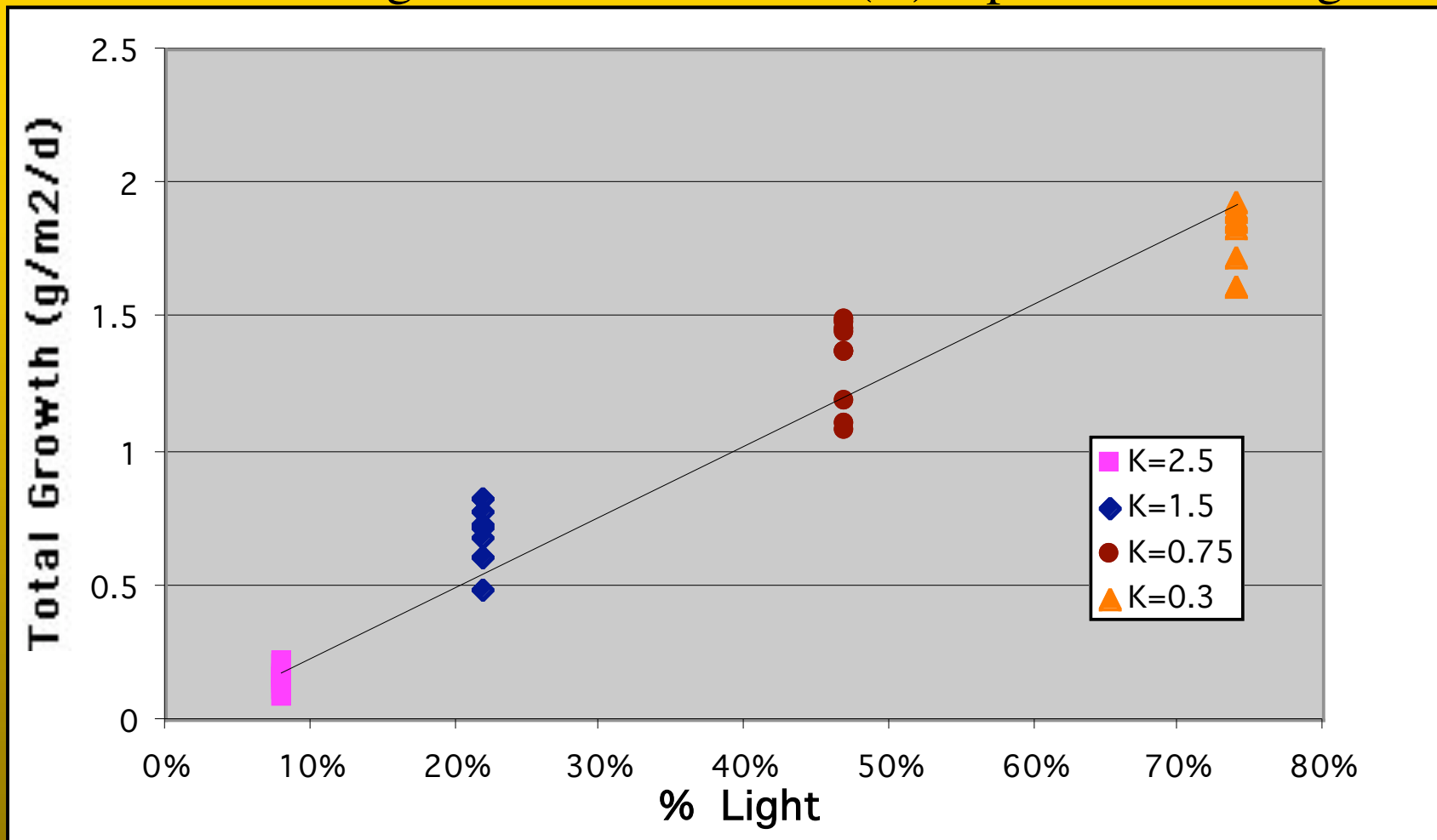
**Massive land
clearing and
deforestation in
Malaysia**

Sedimentation - Road construction in Palau



Poor water clarity

Eelgrass daily growth at 2 meters depth for 9 days in July with different light extinction values (K) replotted vs. % light.

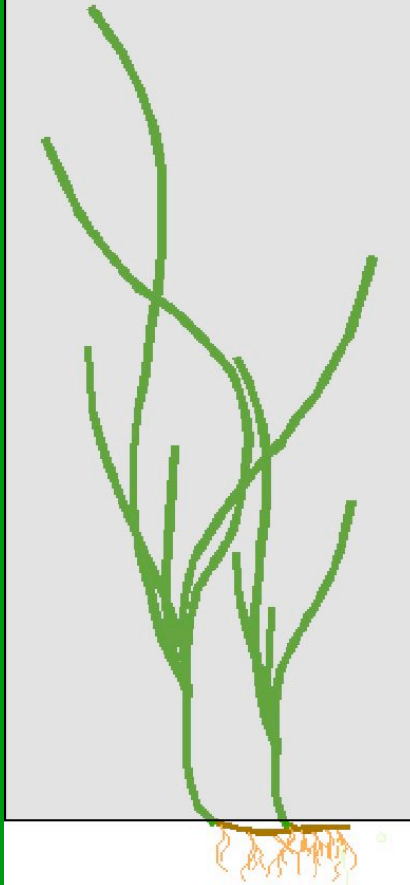


Short, F.T., D.M. Burdick and J.E. Kaldy. 1995. Mesocosm experiments quantify the effects of eutrophication on eelgrass, *Zostera marina* L., Limnology and Oceanography 40:740-749

Water quality and light

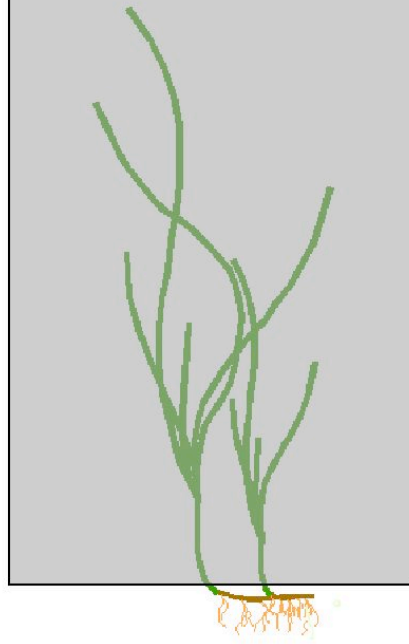
Good

68%



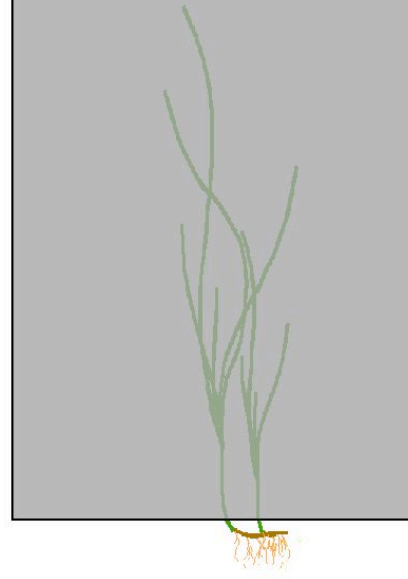
Fair

43%



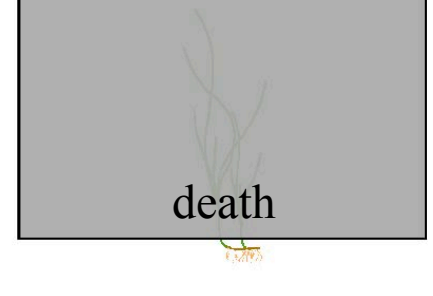
Poor

20%



Awful

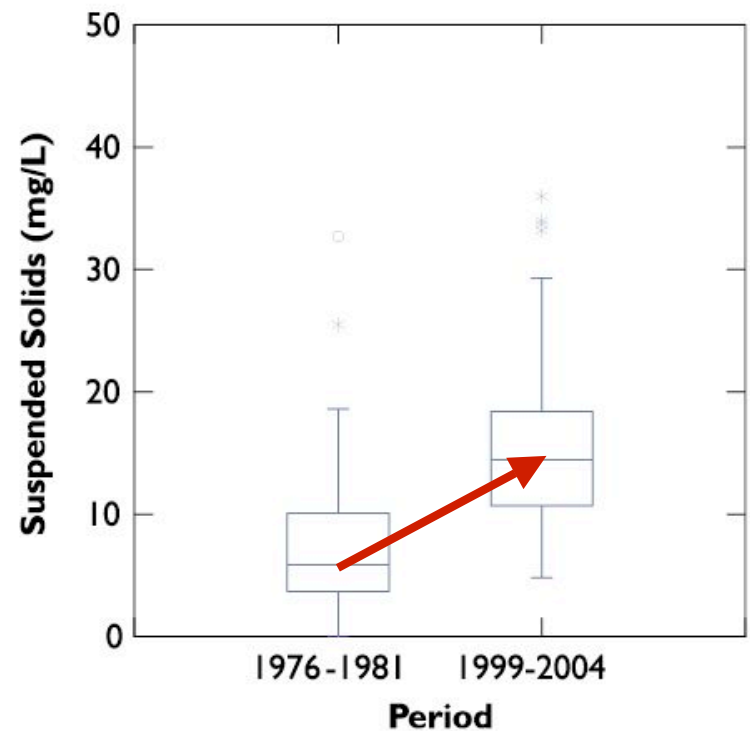
7%



NH State of the Estuary Report 2006

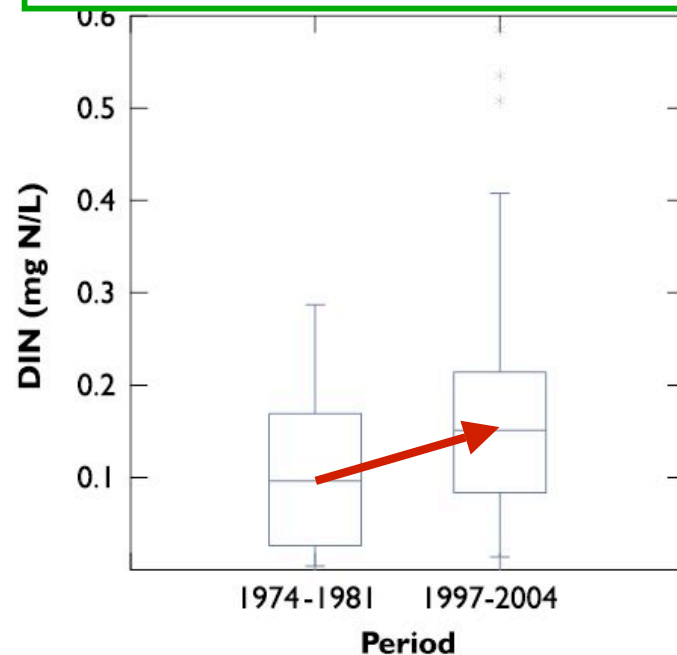
Suspended solids concentrations measured at Adams Point at low tide (Figure 7)

Data Source: UNH Jackson
Estuarine Laboratory



Dissolved inorganic nitrogen concentrations measured at Adams Point at low tide (Figure 6)

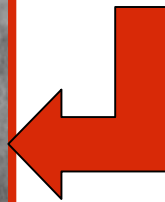
Data Source: UNH Jackson
Estuarine Laboratory





OYSTERS

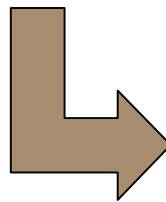
Healthy



Squamscott River reef

Bellamy River dead oysters

Siltation



Nannie Island bed

Oyster River dead reef

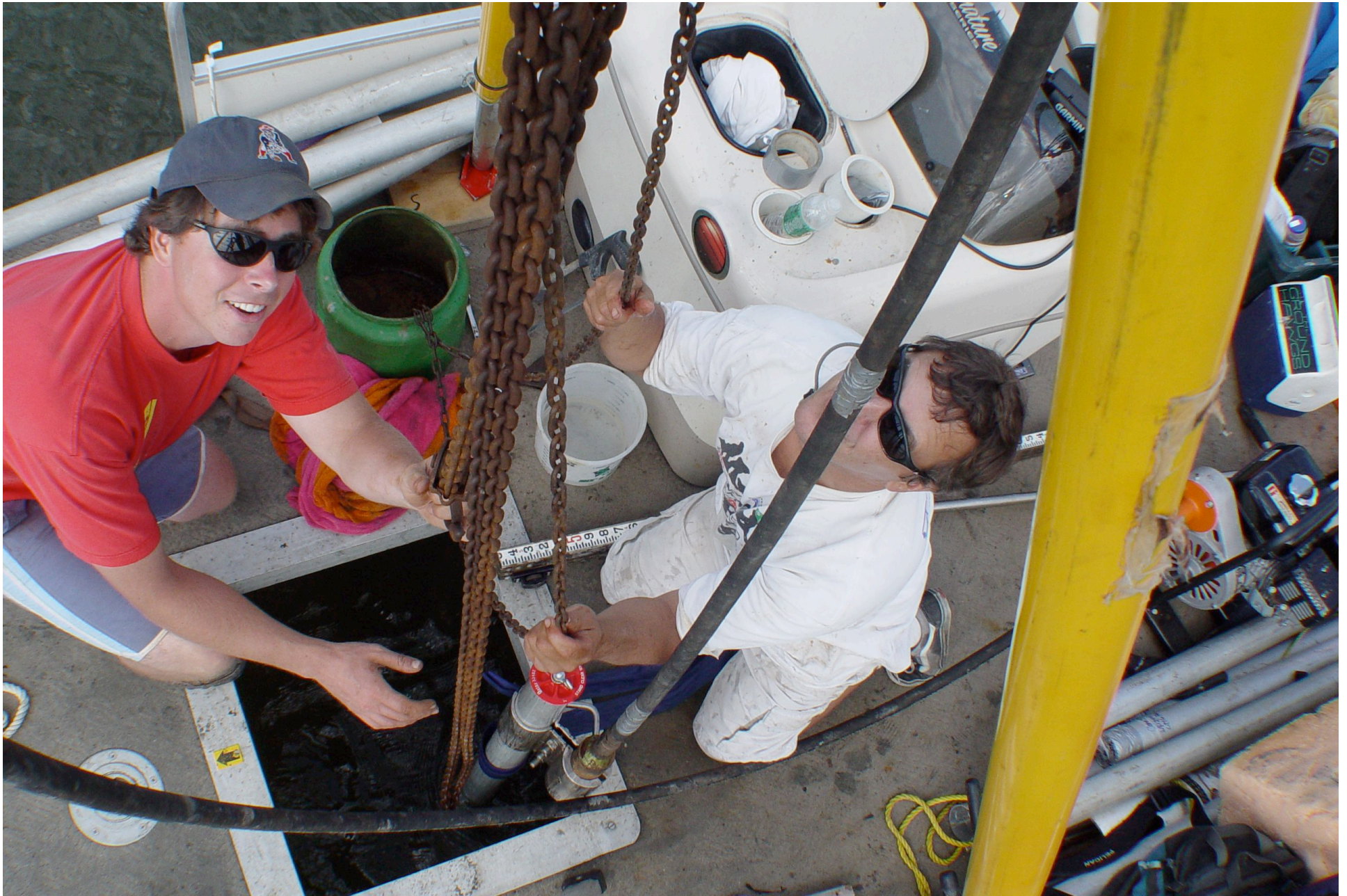


Fig 1. Donald Keirstead and Jim Turenne of USDA-NRCS extracting sediment cores from the Bellamy River with a standard Vibracore™ mounted to a shallow-draft pontoon boat. *Photo: Gregg Moore*



Fig 2. Cross section of sediment core sample from the Bellamy River. A buried shell layer is evident just below 30cm.
Photo: Donald Keirstead

STATE OF THE ESTUARIES

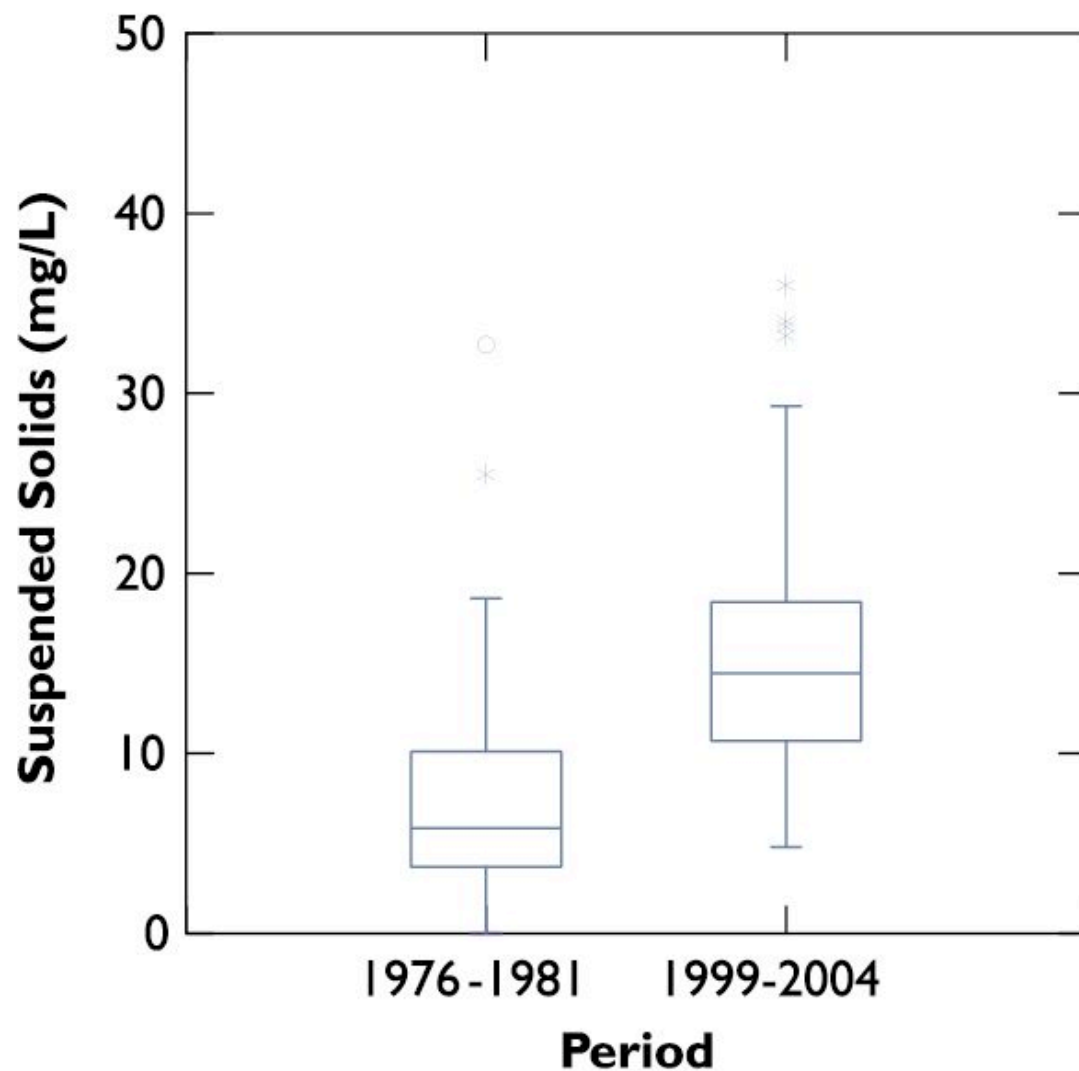
2006



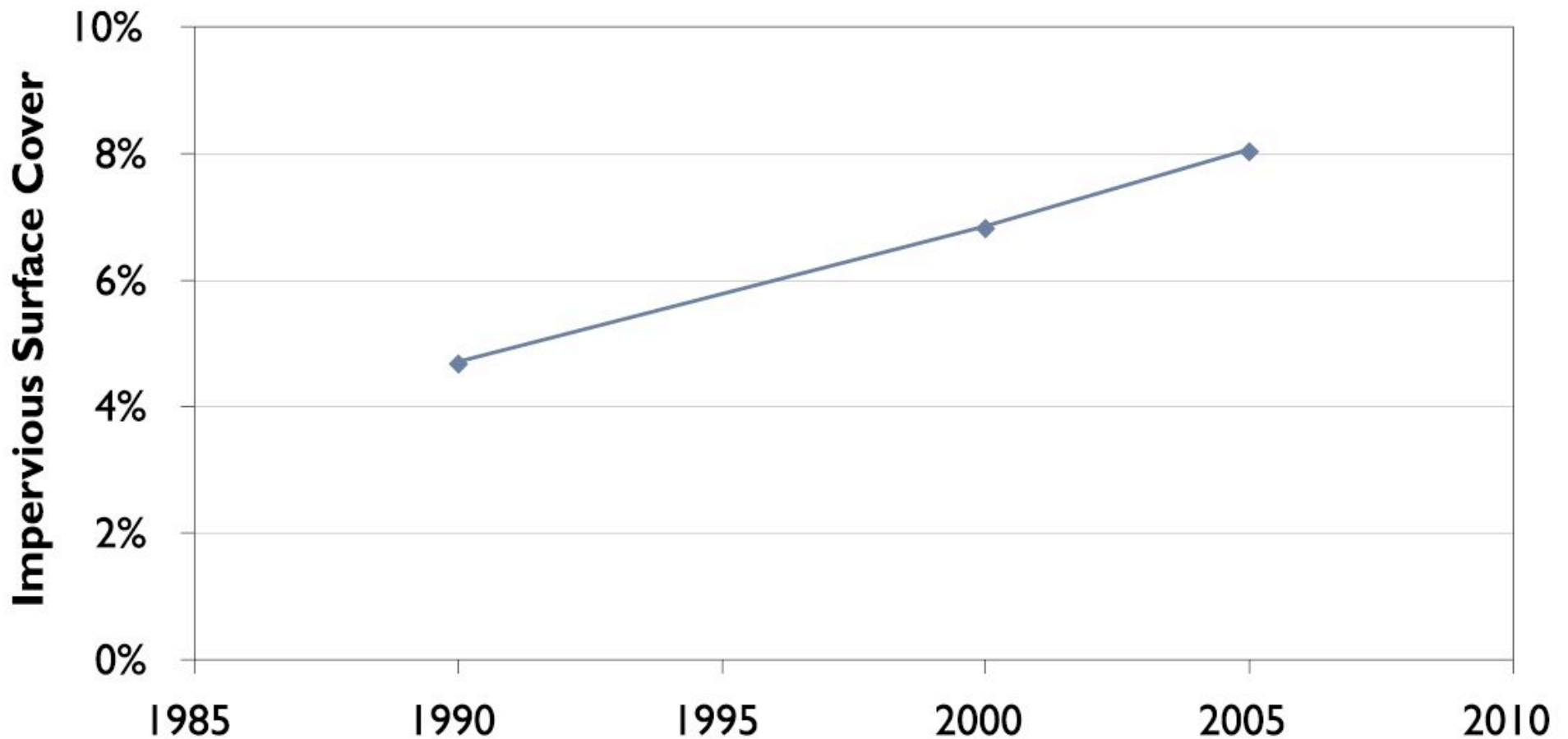
New Hampshire
Estuaries Project

Suspended solids concentrations measured at Adams Point at low tide (Figure 7)

Data Source: UNH Jackson Estuarine Laboratory

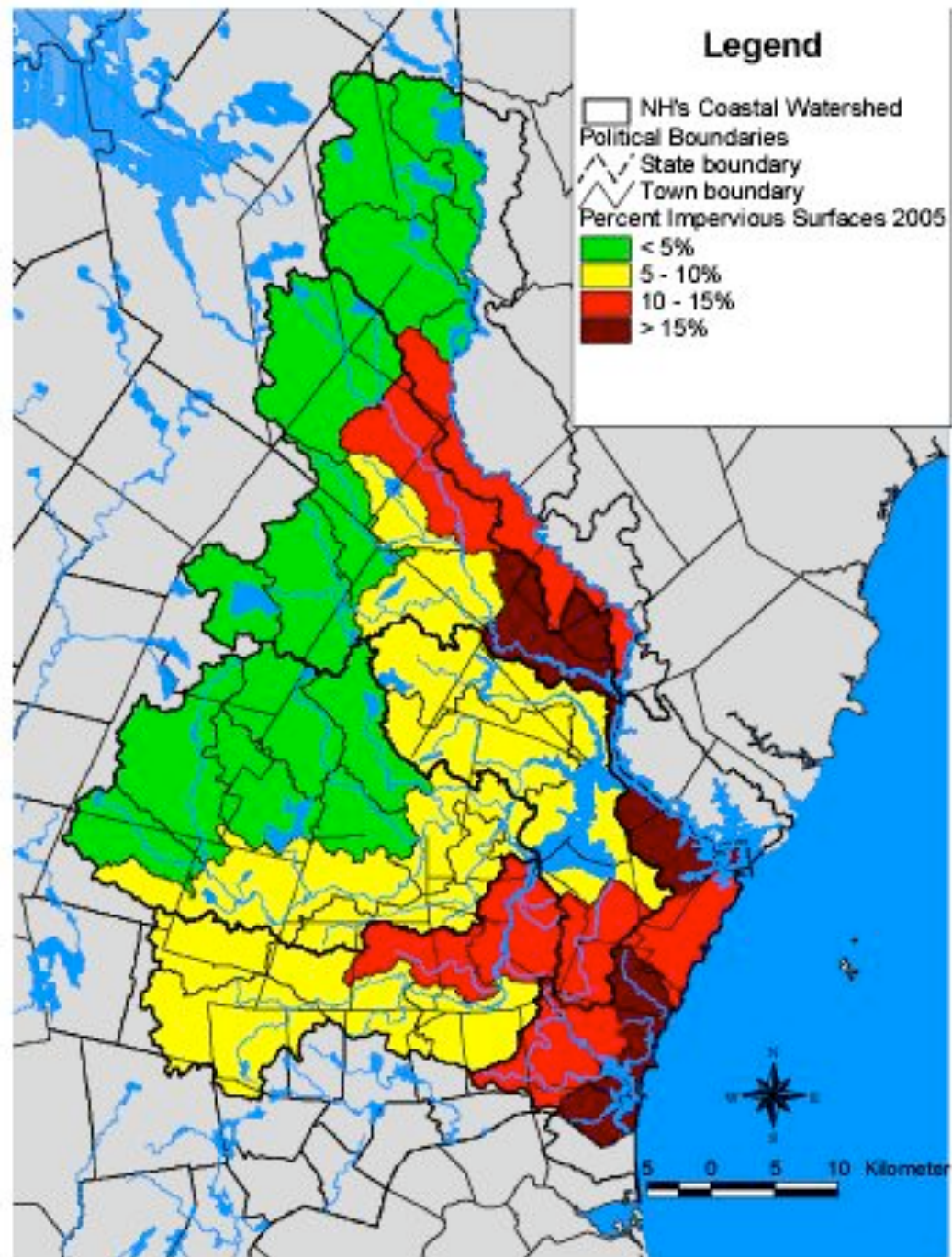


Percent of land area covered by impervious surfaces in the coastal watershed in 1990, 2000, and 2005 (Figure 19)



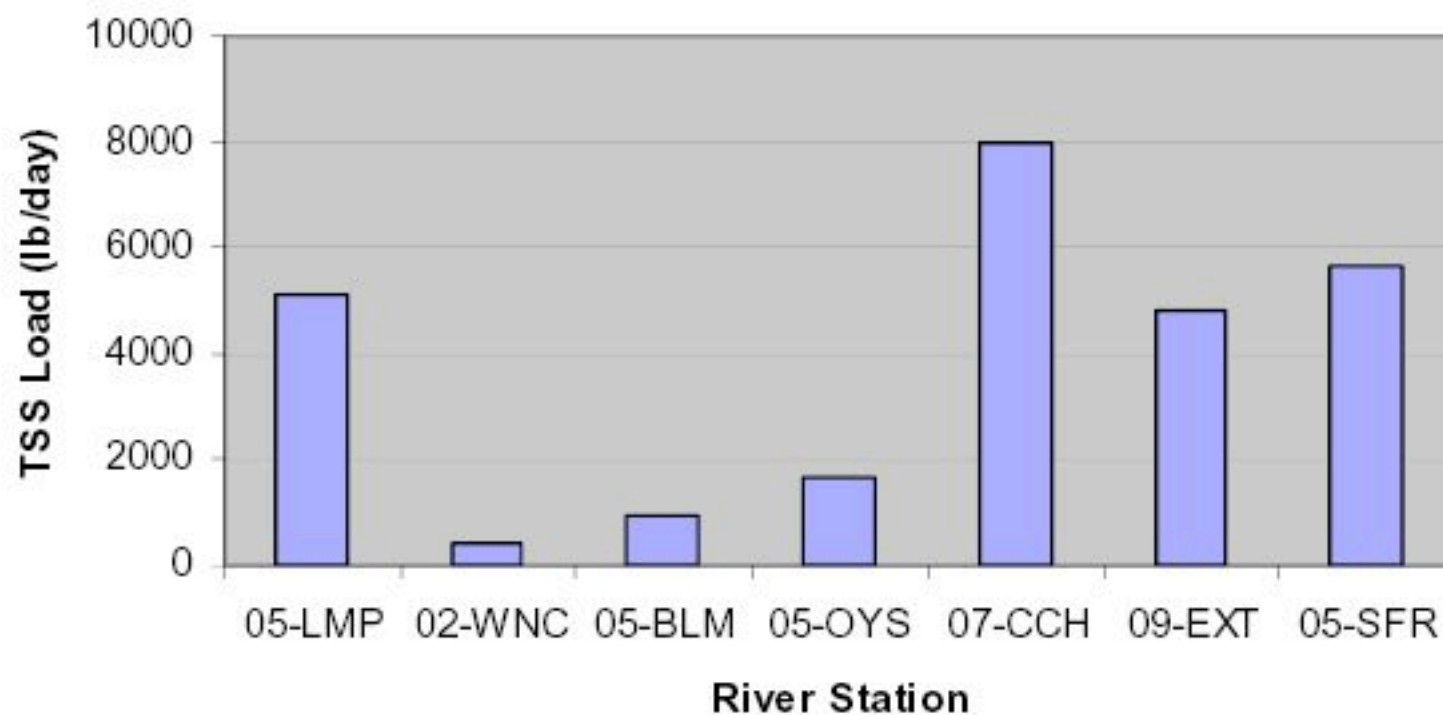
Data Source: UNH Complex Systems Research Center

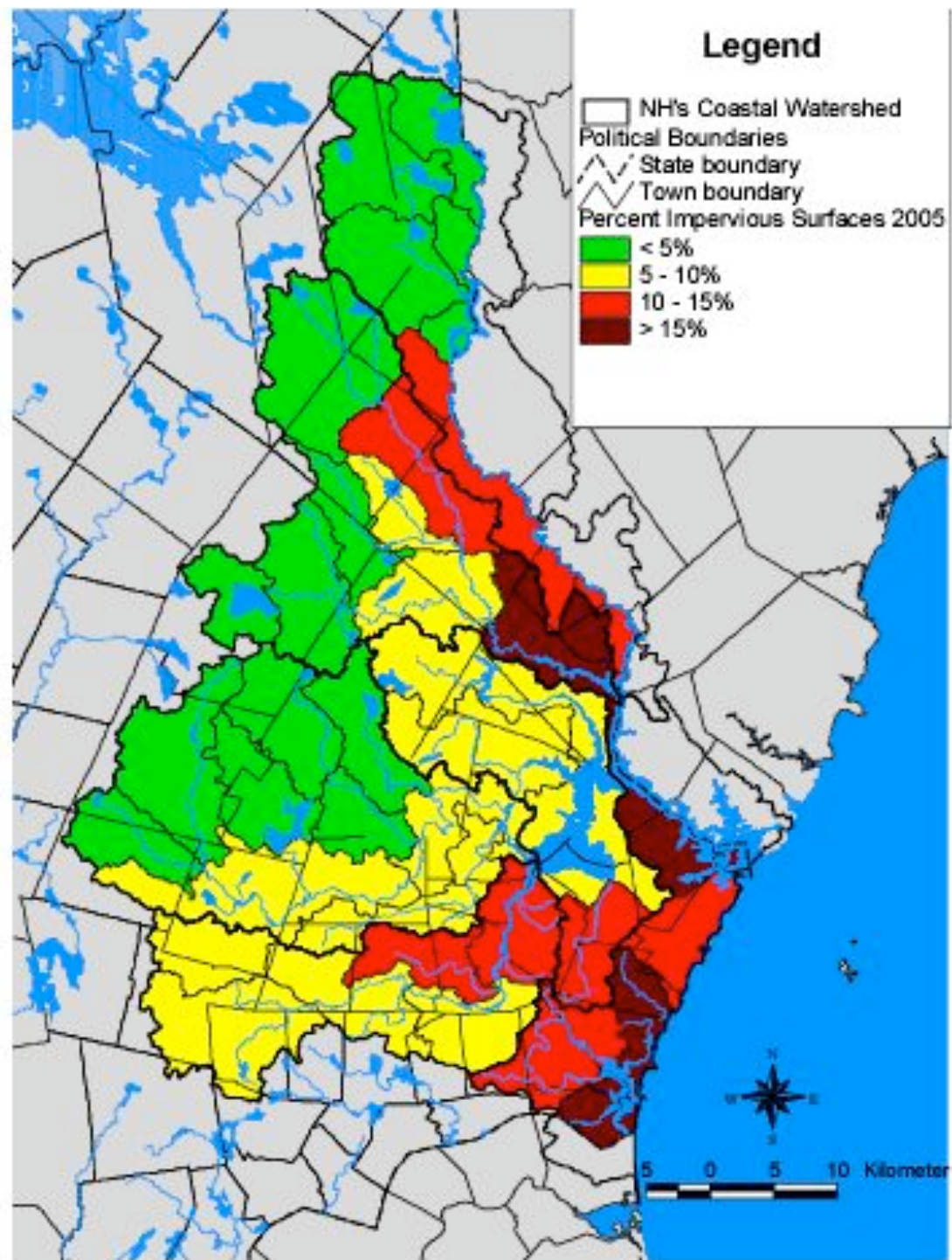
Figure 6: Percent impervious surfaces in coastal watersheds in 2005



Sediment Loads

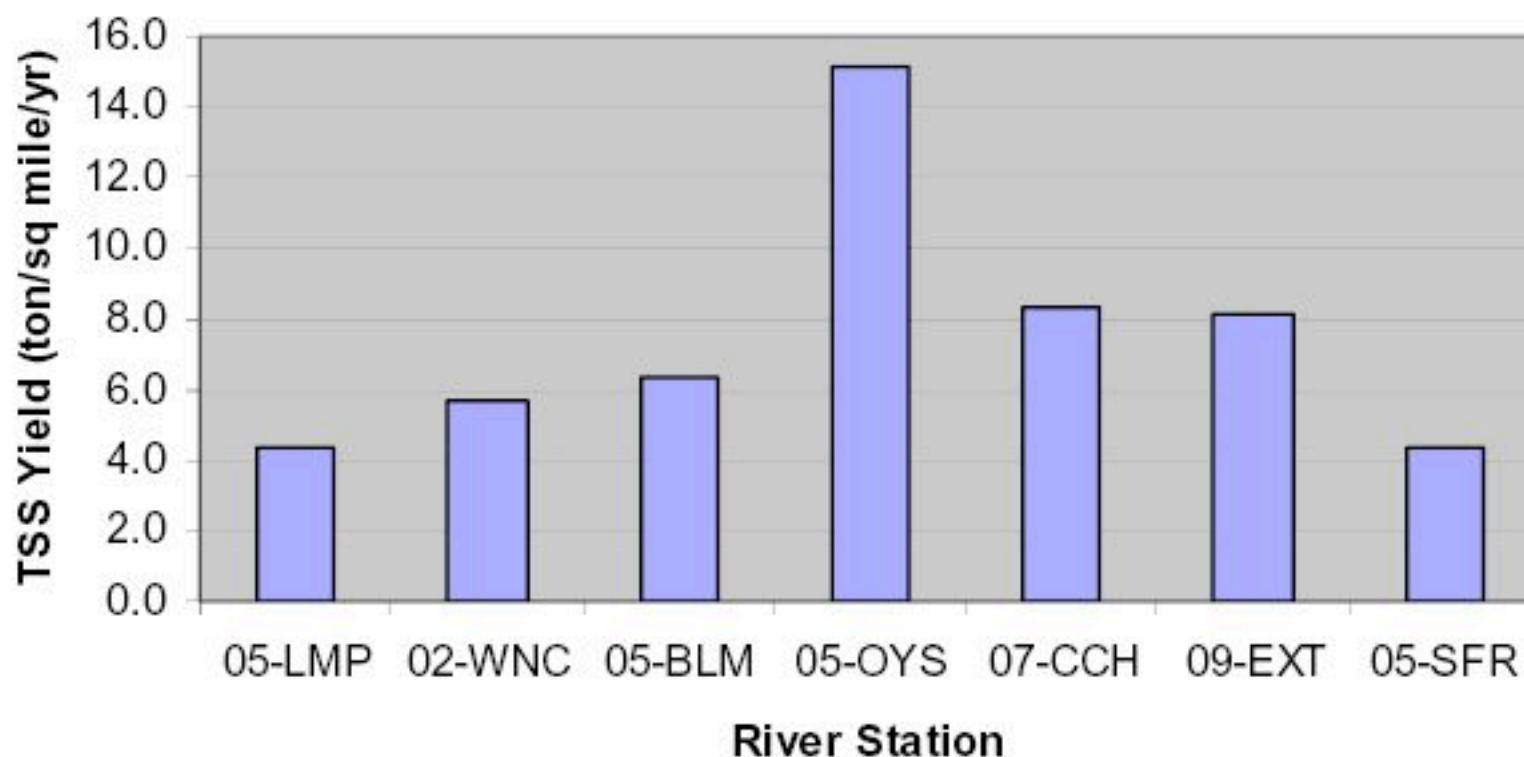
Sediment Loads from GB Tributaries (2002-2005)



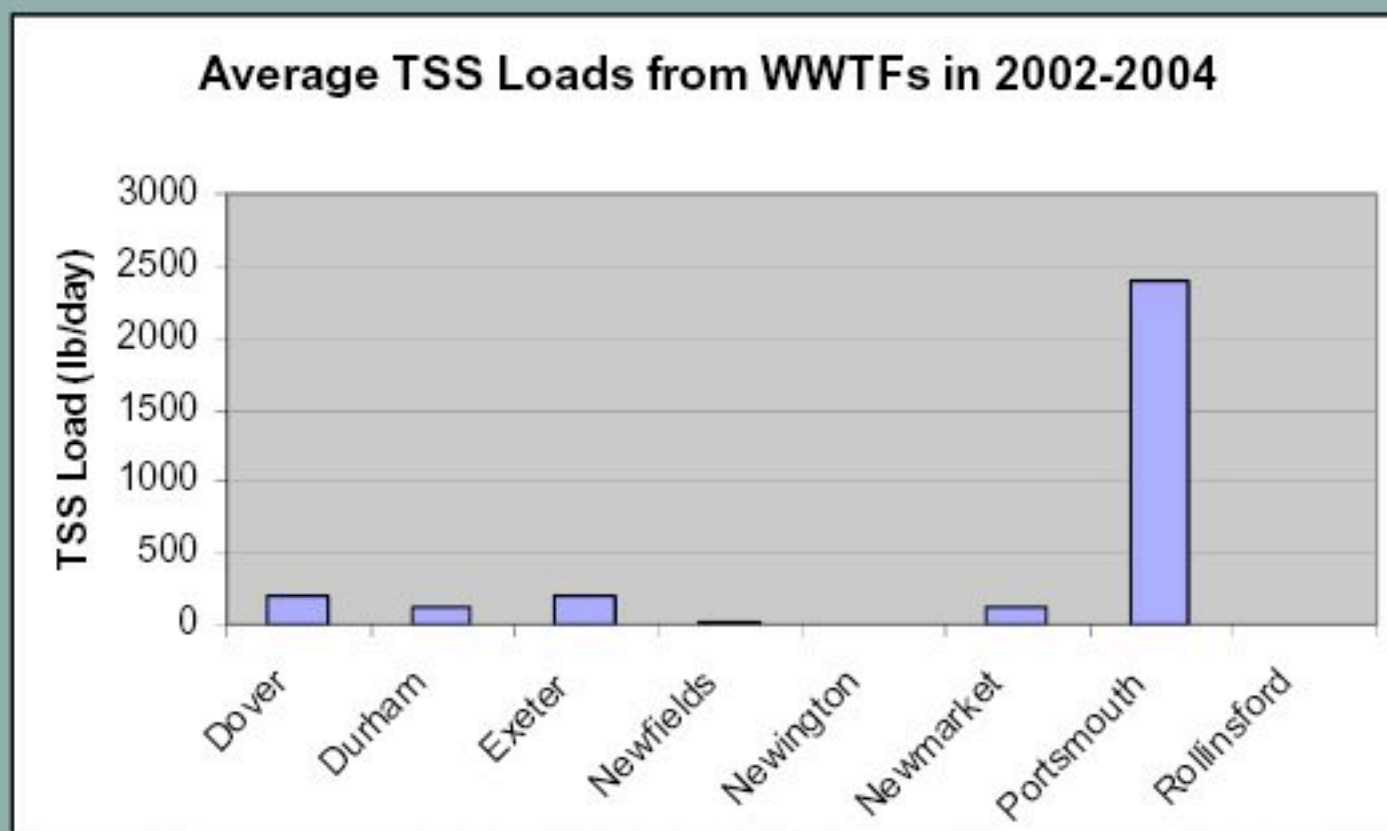


Sediment Yield from Watersheds

Sediment Yields from GB Tributaries (2002-2005)

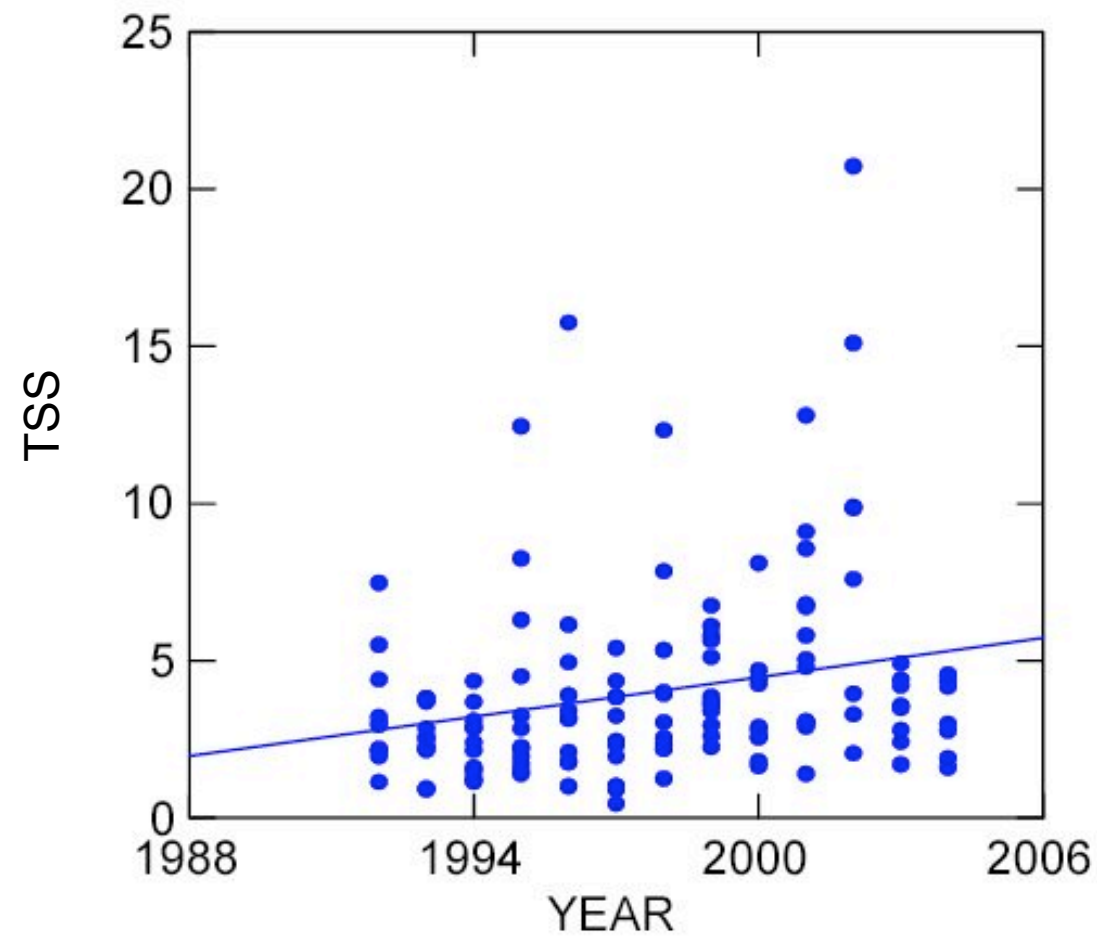


Sediment Loads from WWTFs



**Note: The measured load for the Cocheco River was 8,000 lb/day.
The WWTF loads are all much smaller than the river loads.**

Total Suspended Solids

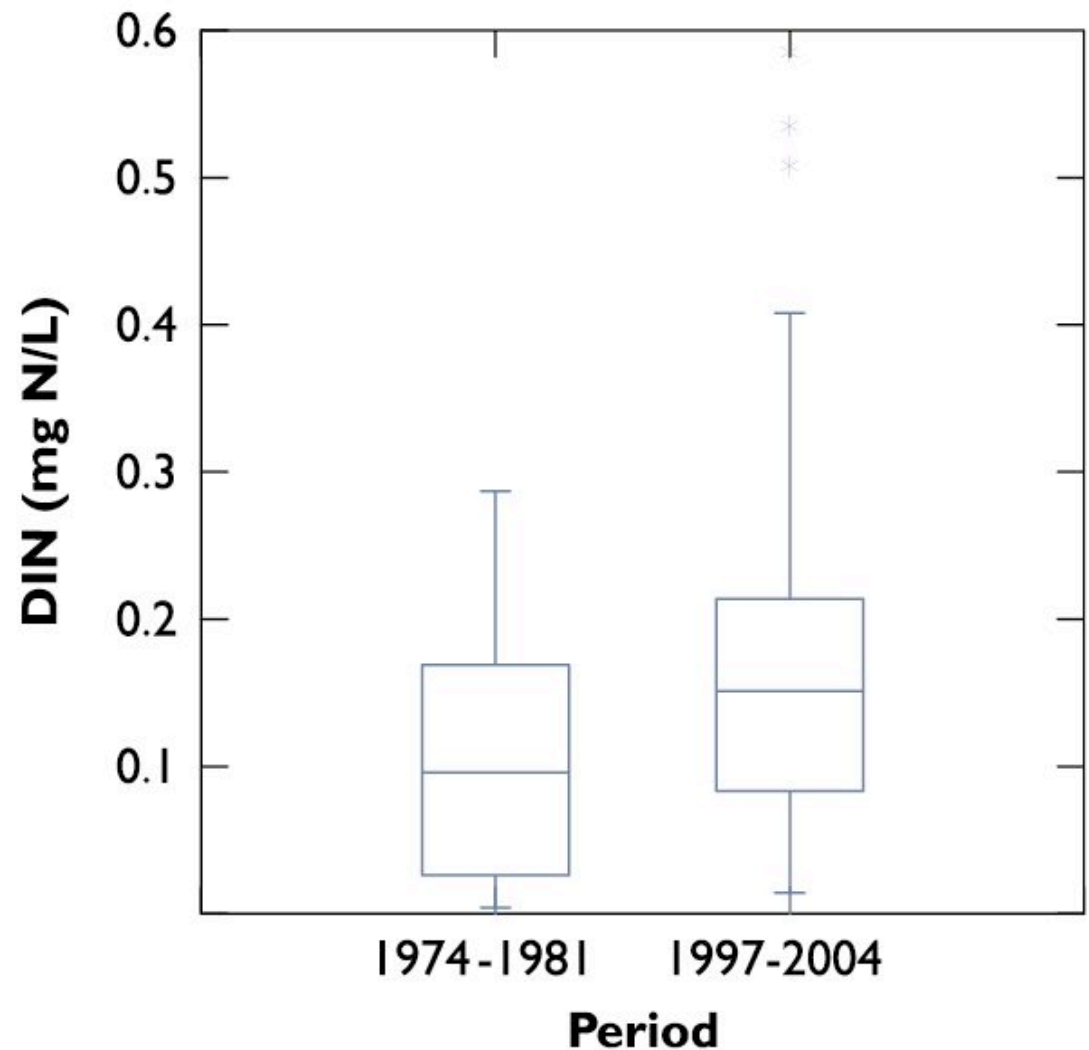


Statistically Significant Trends

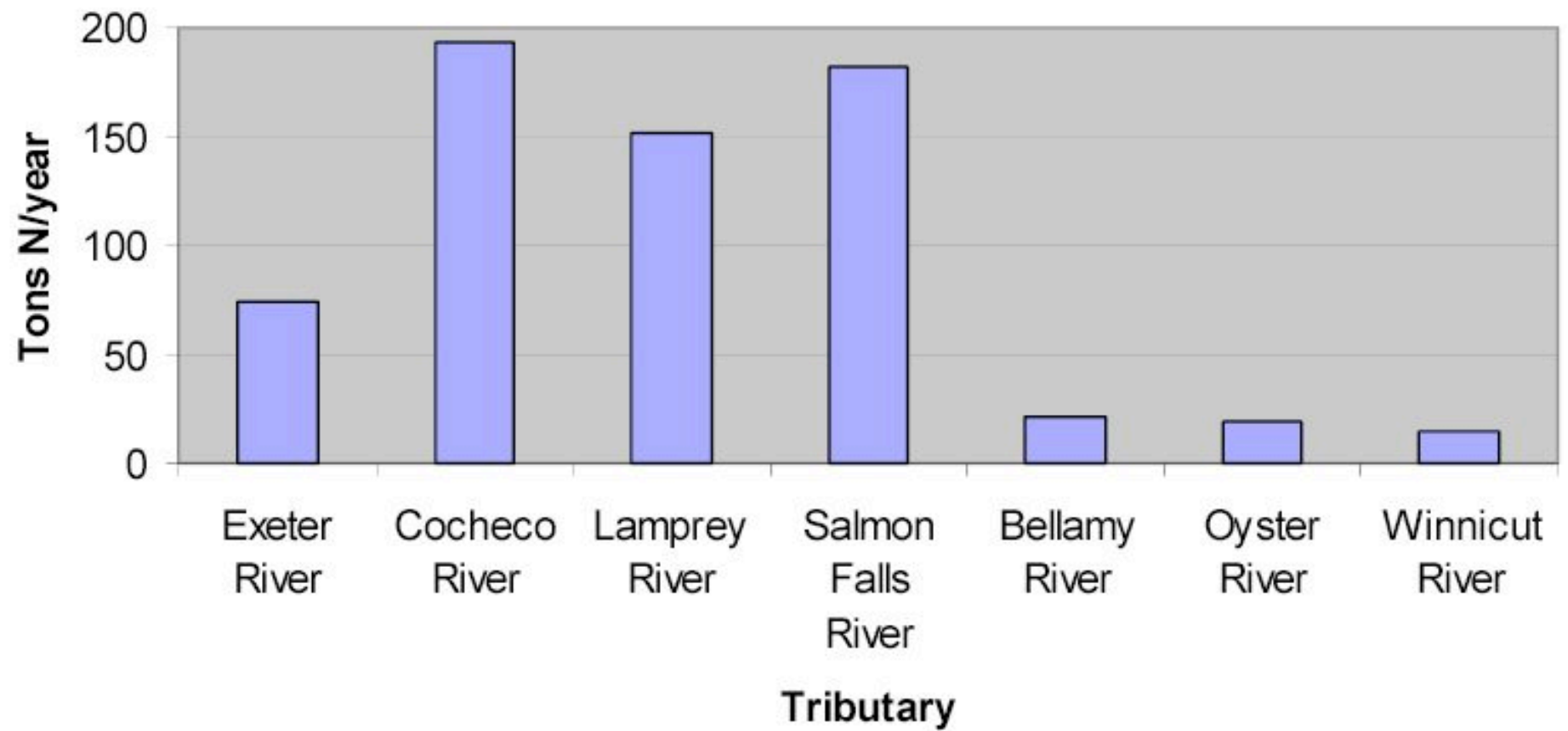
$TSS = 0.209 * YEAR - 413$ Percent Change 1992-2004 = 76%

Dissolved inorganic nitrogen concentrations measured at Adams Point at low tide (Figure 6)

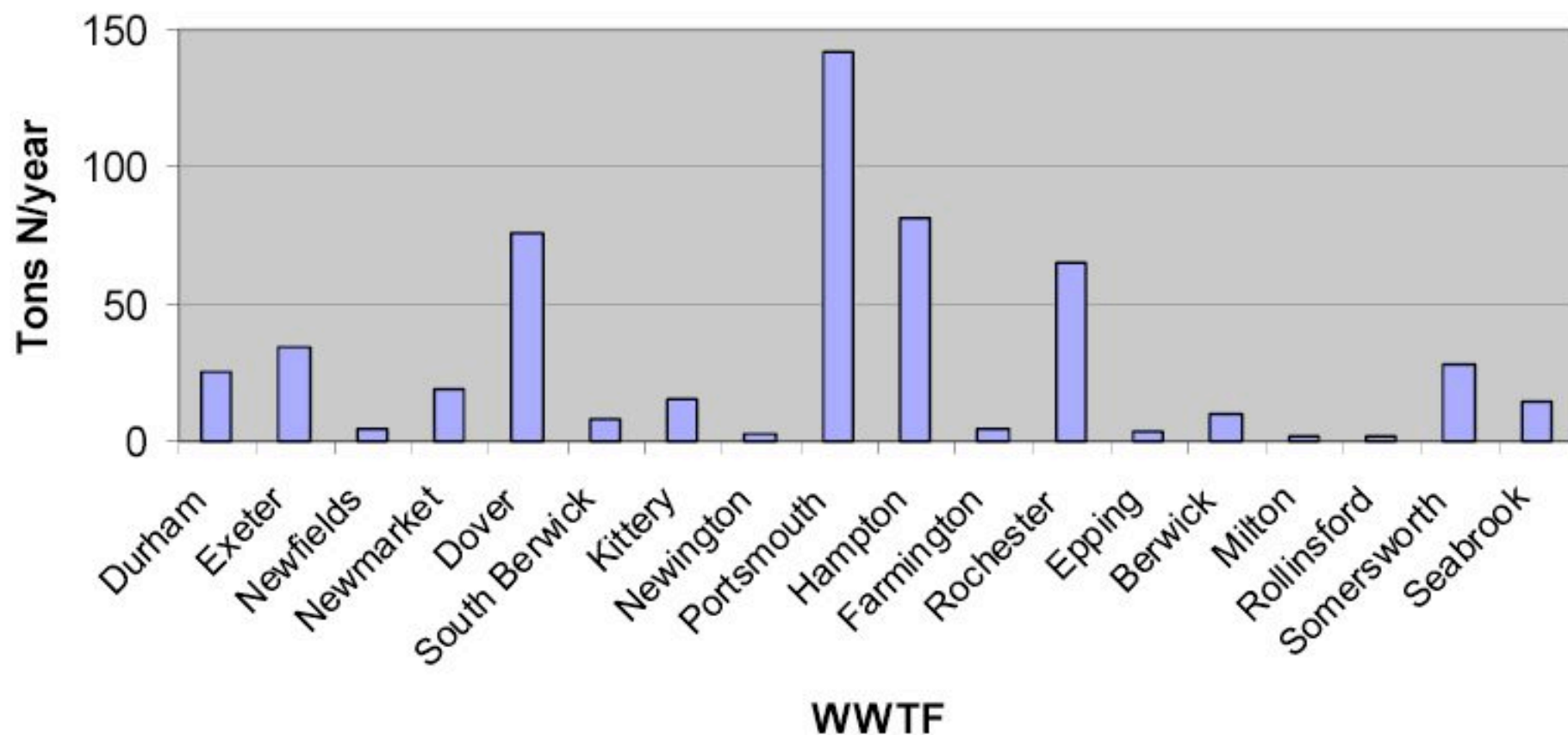
Data Source: UNH Jackson Estuarine Laboratory



Total Nitrogen Load from Tributaries



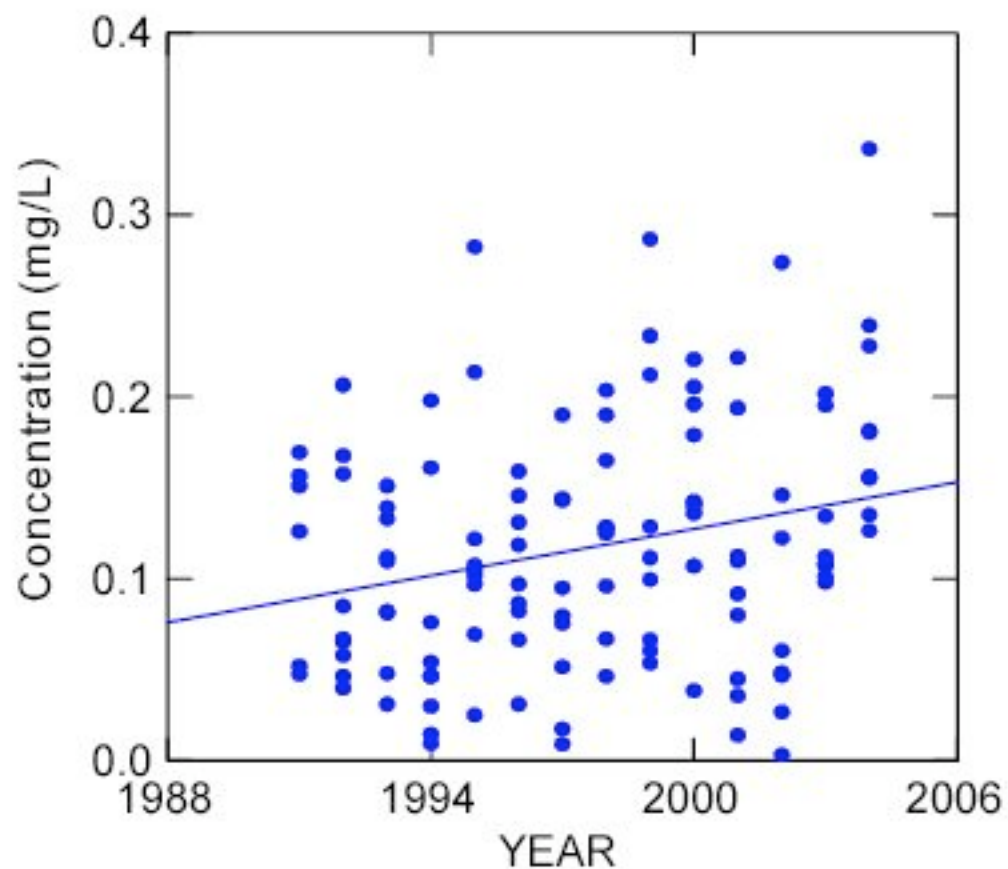
Total Nitrogen Load from Coastal WWTFs



NHEP ENVIRONMENTAL INDICATOR REPORT
WATER QUALITY, 2006

Chapmans Landing in the Squamscott River

Nitrogen, Nitrate + Nitrite as N



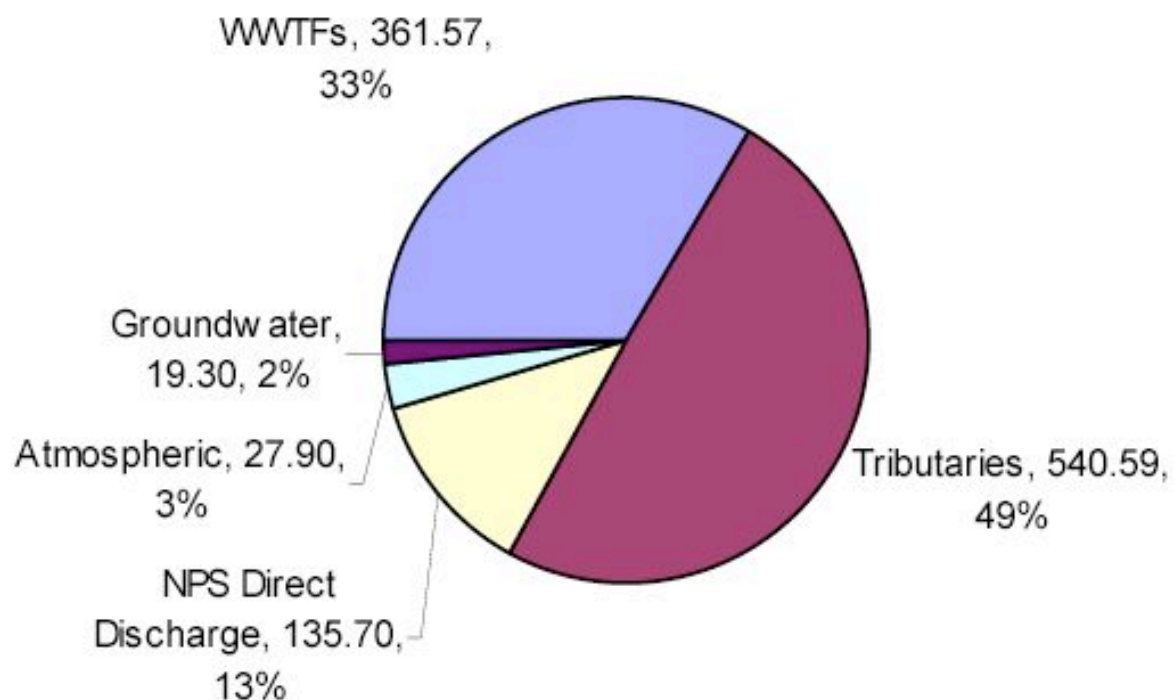
Statistically Significant Trends

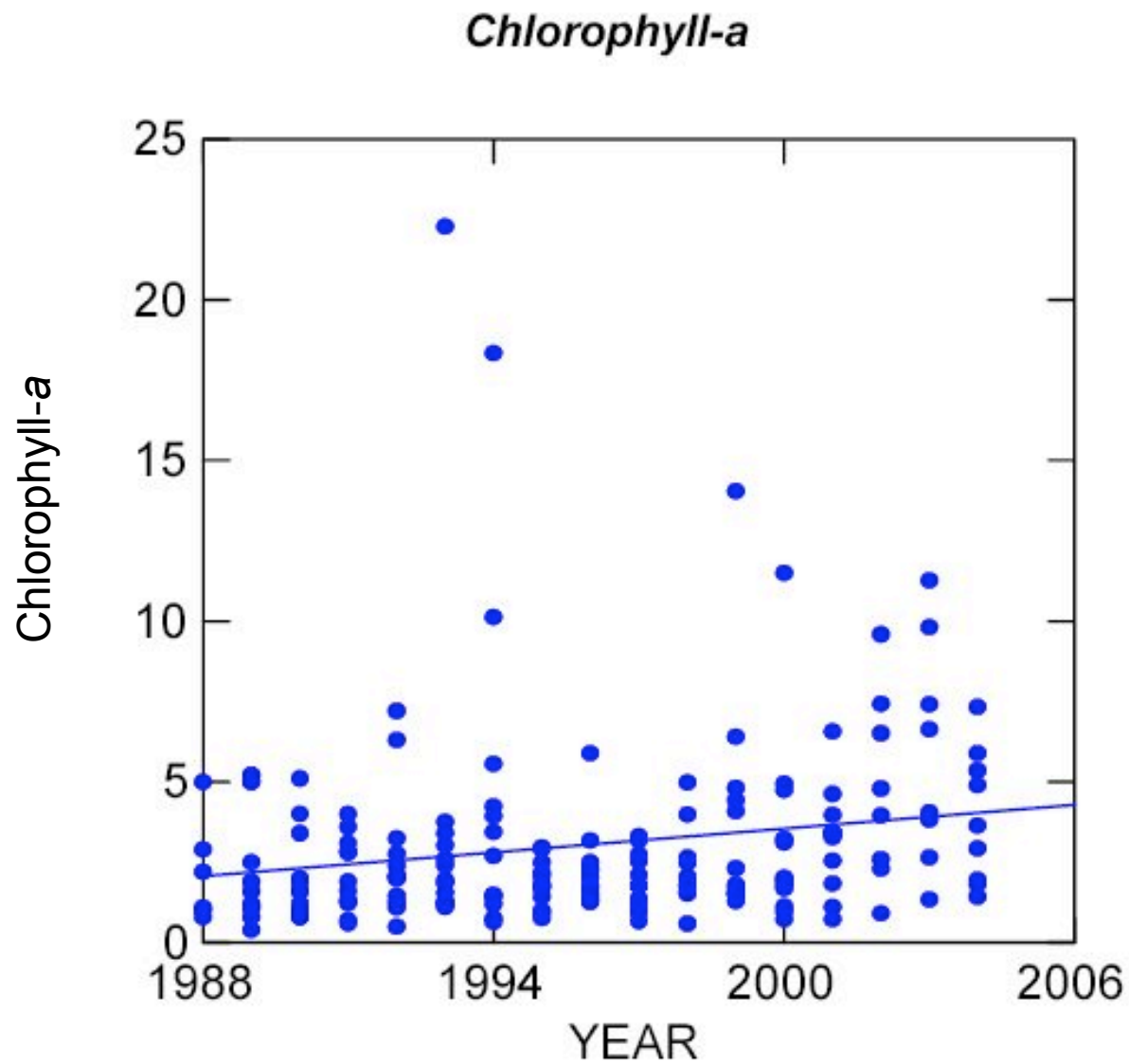
Nitrogen, Nitrate+Nitrite as N = $0.00428 * \text{YEAR} - 8.440$ ($P=0.005$)

Percent Change 1991-2004 = 63%

Figure 30: Total nitrogen loads to the Great Bay and Upper Piscataqua River estuaries by source category assuming 50% of WWTF loads in the lower Piscataqua River enter the system

**Great Bay and Upper Piscataqua River Estuary
Total Nitrogen Loads in tons N per year**

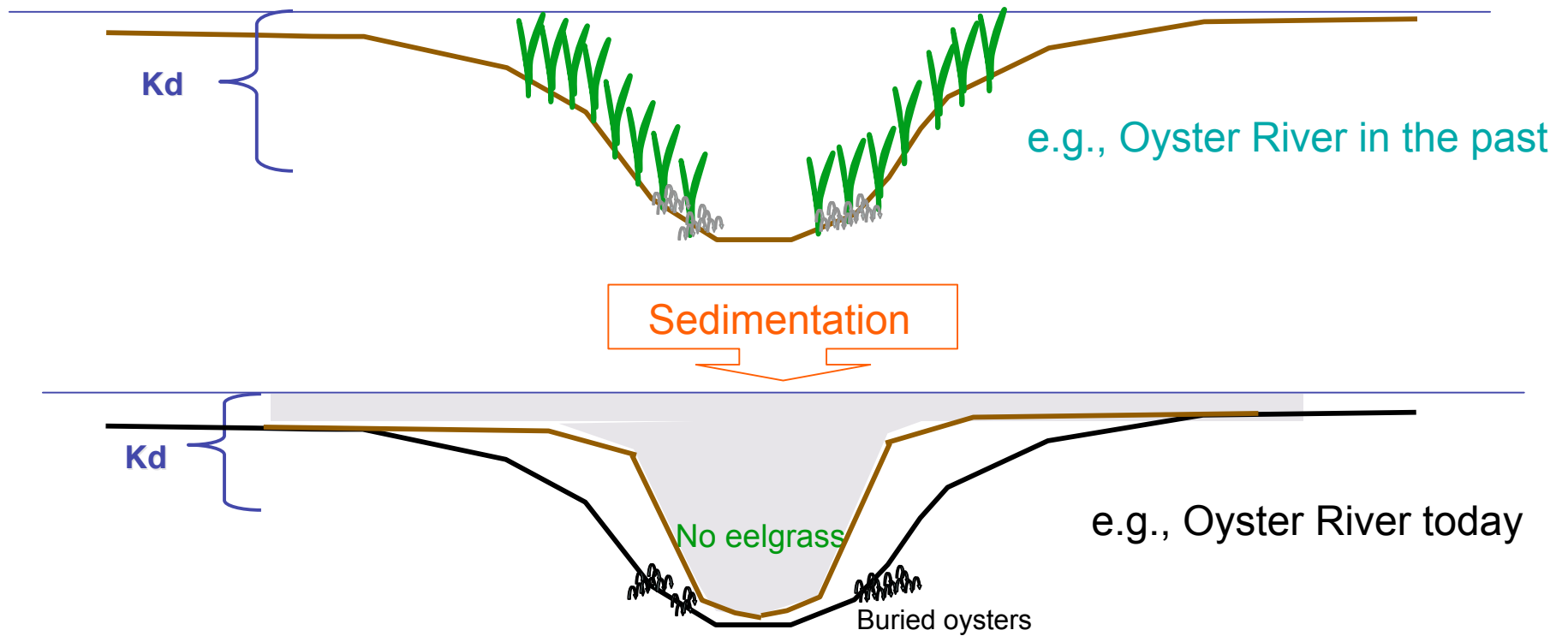




Statistically Significant Trends

Chlorophyll-a = $0.124 * \text{YEAR} - 243.9$ Percent Change 1988-2004 = 76%

The Problem of Sediment Loading and Reduced Water Clarity



Estuarine Engineering

Channel Dredging

